PATENT ABSTRACTS OF JAPAN

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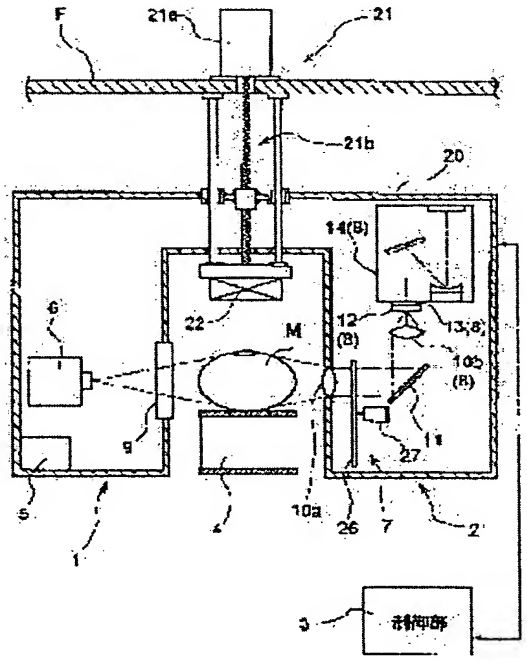
(54) SPECTROSCOPE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a spectroscope capable of measuring accurately the internal quality of a measuring object by preventing the reduction of an S/N (signal to noise) ratio, while adjusting the incident quantity into a light receiving means at a set proper quantity.

SOLUTION: This spectroscope is provided with a floodlighting means 1 for irradiating the measuring object M positioned on a measuring object spot with light, a light receiving means 8 for spectrally diffracting transmitted light or reflected light from the measuring object M, and receiving spectrally diffracted light, and a control means 3 for controlling the operation of each part, and is constituted so that the control means 3 analyzes the internal quality of the measuring object by light received by the light receiving means 8. The spectroscope is constituted so that a dimming means 7 capable of dimming transmitted light or reflected light and adjusting the dimming quantity is installed between the measuring object M and the light receiving means 8, and that the control means 3 adjusts the dimming quantity generated by the dimming means 7 so that the incident quantity of transmitted light or reflected light into the light receiving means becomes the set proper quantity.



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* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] A floodlighting means to irradiate light at the measured object located in the part for measurement, and a light-receiving means to carry out the spectrum of the transmitted light or the reflected light from said measured object, and to receive the light by which the spectrum was carried out, By the light which the control means which controls actuation of each part was established, and said control means received with said light-receiving means It is spectral-analysis equipment constituted so that the internal quality of said measured object may be analyzed. Between said measured objects and said light-receiving means Spectral-analysis equipment with which extinction of said transmitted light or said reflected light is carried out, and an extinction means by which the amount of extinction can be adjusted freely is established, and said control means is constituted so that the amount of incidence to said light-receiving means of said transmitted light or said reflected light may, if possible, adjust the amount of extinction by said extinction means to a setting proper amount.
[Claim 2] Spectral-analysis equipment according to claim 1 constituted that the amount of target extinction for said control means to make the amount of incidence to said light-receiving means of said transmitted light or said reflected light a setting proper amount based on the measurement conditions inputted beforehand should be calculated, and it should make the calculated amount of target extinction so that the amount of extinction by said extinction means may be adjusted.
[Claim 3] Spectral-analysis equipment according to claim 1 or 2 which said floodlighting means and said light-receiving means are constituted free [justification] in one, and is constituted that said control means should irradiate light with said floodlighting means focusing on the central part of said measured object at said measured object based on the magnitude information on said measured object so that the location of said floodlighting means and said light-receiving means may be adjusted.
[Claim 4] Said floodlighting means is spectral-analysis equipment given in any 1 term of claims 1-3 which beam light is irradiated at said measured object, and the exposure range by the beam light consists of, enabling free modification, and said control means consists of based on the magnitude information on said measured object so that the magnitude of the measured object is large and said exposure range may, if possible, adjust the exposure range by said beam light greatly.
[Claim 5] Two or more extinction objects with which the amounts of extinction of said transmitted light or said reflected light differ [said extinction means], The extinction object of these plurality is established, and have the body of revolution which can be rotated freely and it is constituted. It is prepared in said body of revolution in distance or the condition of separating spacing to a hoop direction mostly in the location of **** distance. said two or more extinction objects -- from the core of said body of revolution -- etc. -- Spectral-analysis equipment given in any 1 term of claims 1-4 constituted so that said control means may carry out rotation actuation of said body of revolution and may make the amount of extinction by said extinction means change.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] A floodlighting means irradiate light at the measured object located in the part for measurement, a light-receiving means carry out the spectrum of the transmitted light or the reflected light from said measured object, and receive the light by which the spectrum was carried out, and the control means that control actuation of each part are established, and this invention relates to the spectral-analysis equipment constituted by the light which said control means received with said light-receiving means so that the internal quality of said measured object may analyze.
[0002]
[Description of the Prior Art] The above spectral-analysis equipments For example, after carrying out the spectrum of the transmitted light or the reflected light from a measured object in a concave grating, The line sensor of the charge accumulation-of-electricity type which arranged in in the shape of an array the photo detector which consists of two or more optoelectric transducers etc. is used as a light-receiving means. the spectrum measured with such a light-receiving means -- the spectrum measured with a light-receiving means since the internal quality of measured objects, such as garden stuff, is reflected in spectrum data -- based on spectrum data, it is used in order to analyze the internal quality of measured objects, such as garden stuff.
[0003] Although it is necessary to make the amount of charge accumulation of electricity of a line sensor into a proper amount with this kind of spectral-analysis equipment, for example in order to analyze the internal quality of a measured object with a sufficient precision when the line sensor of a charge accumulation-of-electricity type is used as a light-receiving means Since the amount of incidence to a light-receiving means will change and the amount of charge accumulation of electricity of a line sensor will change with measurement conditions, such as a form of a measured object, and magnitude, etc. in connection with it, to adjust the amount of incidence to a light-receiving means is desired so that the amount of charge accumulation of electricity of a line sensor may turn into a proper amount. If explanation is added, in order that the quantity of light of the transmitted light from a measured object or the reflected light may change, the amount of incidence to a light-receiving means will change with measurement conditions, such as a form of a measured object, and magnitude, etc., but when the amount of incidence to a light-receiving means changes and the amount of incidence to the light-receiving means becomes larger than a setting proper amount, there is a possibility that the charge accumulated dose of a line sensor may be saturated exceeding the maximum accumulated dose. Moreover, when the amount of incidence to a light-receiving means changes and the amount of incidence to the light-receiving means becomes smaller than a setting proper amount conversely, there is a possibility that the charge accumulated dose of a line sensor may be insufficient, an S/N (signal-to-noise) ratio may fall, and a measurement error may become large. In order to measure the internal quality of a measured object with a sufficient precision with this kind of spectral-analysis equipment like the above, to make the amount of incidence to a light-receiving means into a setting proper amount is desired.
[0004] Then, conventional spectral-analysis equipment is made to make the amount of incidence to a

light-receiving means a setting proper amount by adjusting the quantity of light irradiated by the measured object from a floodlighting means. If it explains concretely, the extinction means to which extinction of the light from a floodlighting means is carried out establishes between a floodlighting means and a measured object, and constitute, or a control means constitutes so that the amount of incidence to a light-receiving means may turn into a setting proper amount, and the amount of floodlighting from a floodlighting means may be adjusted, so that the amount of incidence to a light-receiving means may turn into a setting proper amount and a control means may adjust the amount of extinction by the extinction means.

[0005] If it explains concretely, when measurement conditions are measurement conditions to which the quantity of light of the transmitted light from a measured object or the reflected light becomes small Measurement conditions make the amount of extinction by the extinction means smaller than the time of being the measurement conditions to which the quantity of light of the transmitted light from a measured object or the reflected light becomes large, or Or it adjusts to the side to which the quantity of light of the transmitted light from a measured object or the reflected light increases by enlarging the amount of floodlighting from a floodlighting means. Sometimes measurement conditions to which it is made to become a setting proper amount, and the quantity of light of the transmitted light from a measured object or the reflected light becomes [measurement conditions] large conversely the amount of incidence to a light-receiving means Measurement conditions make the amount of extinction by the extinction means larger than the time of being the measurement conditions to which the quantity of light of the transmitted light from a measured object or the reflected light becomes small, or Or it adjusts to the side to which the quantity of light of the transmitted light from a measured object or the reflected light decreases, and the amount of incidence to a light-receiving means is made to become a setting proper amount by making small the amount of floodlighting from a floodlighting means.

[0006]

[Problem(s) to be Solved by the Invention] In the above-mentioned conventional thing, since the quantity of light irradiated by the measured object from a floodlighting means is adjusted, the light with which the light from a floodlighting means will be irradiated by the measured object, and was irradiated by the measured object after the quantity of light was adjusted turns into the transmitted light from a measured object, or the reflected light, and incidence will be carried out to a light-receiving means.

[0007] Therefore, since the permeability or reflection factor of a measured object will be reflected as it is, the quantity of light by which incidence is carried out to a light-receiving means for example, in being larger than the value which the permeability or reflection factor of a measured object assumes The amount of incidence to a light-receiving means becomes larger than a setting proper amount, and in being smaller than the value which the permeability or reflection factor of a measured object assumes conversely, the amount of incidence to a light-receiving means becomes smaller than a setting proper amount, and there is a possibility that the amount of incidence to a light-receiving means cannot adjust to a setting proper amount. Even if it adjusts the quantity of light irradiated by the measured object from a floodlighting means like the above-mentioned conventional thing like the above, the amount of incidence to a light-receiving means cannot necessarily be adjusted to a setting proper amount, but there is a possibility that the internal quality of a measured object may be immeasurable with a sufficient precision.

[0008] Moreover, since a measured object irradiates and the transmitted light or the reflected light from the measured object carries out incidence to a light-receiving means in the above-mentioned conventional thing after the light from a floodlighting means adjusts the quantity of light For example, if light other than the transmitted light from a measured object or the reflected light exists between a measured object and a light-receiving means Incidence will be carried out to a light-receiving means, an S/N (signal-to-noise) ratio becomes small, without carrying out extinction of the light other than the transmitted light or the reflected light, and there is a possibility that the internal quality of a measured object may be immeasurable with a sufficient precision.

[0009] This invention is made paying attention to this point, and adjusting the amount of incidence to a light-receiving means to a setting proper amount, the purpose prevents that an S/N (signal-to-noise) ratio

becomes small, and is in the point of offering the spectral-analysis equipment which becomes possible [measuring the internal quality of a measured object with a sufficient precision].

[0010]

[Means for Solving the Problem] A floodlighting means to irradiate light at the measured object located in the part for measurement according to invention according to claim 1 in order to attain this purpose, By the light which the spectrum of the transmitted light or the reflected light from said measured object was carried out, a light-receiving means to receive the light by which the spectrum was carried out, and the control means which controls actuation of each part were established, and said control means received with said light-receiving means In the spectral-analysis equipment constituted so that the internal quality of said measured object may be analyzed Between said measured objects and said light-receiving means, carry out extinction of said transmitted light or said reflected light, and an extinction means by which the amount of extinction can be adjusted freely is established. Said control means is constituted so that the amount of incidence to said light-receiving means of said transmitted light or said reflected light may, if possible, adjust the amount of extinction by said extinction means to a setting proper amount.

[0011] Namely, the extinction means in which the amount adjustment of extinction of the transmitted light or the reflected light from a measured object is free is established between a measured object and a light-receiving means, and a control means so that the amount of incidence to the light-receiving means of the transmitted light from a measured object or the reflected light may turn into a setting proper amount Since the amount of extinction by the extinction means will be adjusted, after the light from a floodlighting means is irradiated by the measured object and extinction is first carried out with an extinction means as the transmitted light or the reflected light from the measured object, incidence of it will be carried out to a light-receiving means. Therefore, although the permeability or reflection factor of a measured object will be reflected as it is, since the quantity of light which carries out incidence to an extinction means is adjusted so that the amount of incidence to a light-receiving means may turn into a setting proper amount with an extinction means, it becomes possible to make the amount of incidence to a light-receiving means adjust to a setting proper amount of it.

[0012] Moreover, since the extinction means is established between the measured object and the light-receiving means, even if light other than the transmitted light from a measured object or the reflected light exists between a measured object and a light-receiving means, extinction of the light other than the transmitted light or the reflected light will be carried out with an extinction means, incidence will be carried out to a light-receiving means, and it will become possible to prevent that an S/N (signal-to-noise) ratio becomes small.

[0013] When the above thing was summarized, according to invention according to claim 1, adjusting the amount of incidence to a light-receiving means to a setting proper amount, it prevents that an S/N (signal-to-noise) ratio becomes small, and was able to come to offer the spectral-analysis equipment which becomes possible [measuring the internal quality of a measured object with a sufficient precision].

[0014] According to invention according to claim 2, based on the measurement conditions inputted beforehand, said control means calculates the amount of target extinction for making the amount of incidence to said light-receiving means of said transmitted light or said reflected light into a setting proper amount, and that it should make the calculated amount of target extinction, it is constituted so that the amount of extinction by said extinction means may be adjusted.

[0015] Namely, since the quantity of light of the transmitted light from a measured object or the reflected light will change and the amount of incidence to a light-receiving means will generally change according to measurement conditions, such as a form of a measured object, magnitude, permeability, or a reflection factor In order to measure the internal quality of a measured object with a sufficient precision, according to measurement conditions, such as a form of a measured object, magnitude, permeability, or a reflection factor, to make the amount of incidence to the light-receiving means of the transmitted light or the reflected light change is desired.

[0016] And the amount of incidence which actually carried out incidence to the light-receiving means in

order to meet the request is detected. When a control means calculates the amount of target extinction for making the amount of incidence to a light-receiving means into a setting proper amount based on the detected amount of incidence, and it constitutes so that it may be made the calculated amount of target extinction and the amount of extinction by the extinction means may be adjusted The amount of incidence by which incidence was actually carried out to the light-receiving means is detected, and it becomes possible to adjust the amount of extinction by the extinction means so that it may become the amount of target extinction calculated based on the detected amount of incidence. However, if a floodlighting means is operated and incidence of the transmitted light or the reflected light from a measured object is not once carried out to a light-receiving means in an above-mentioned thing, since the amount of incidence to a light-receiving means cannot be adjusted to a setting proper amount For example, since a floodlighting means will be operated whenever the form of a measured object changes, and incidence of the transmitted light or the reflected light from a measured object will be once carried out to a light-receiving means, there is a possibility that the actuation for adjusting the amount of incidence to a light-receiving means to a setting proper amount may become troublesome.

[0017] The form of the measured object into which a control means is beforehand inputted to it according to invention according to claim 2, Based on measurement conditions, such as magnitude, permeability, or a reflection factor, the amount of target extinction is calculated so that the permeability or reflection factor of a measured object is large and the amount of target extinction may become large. Even if the form of a measured object changes and it does not operate a floodlighting means, for example since the amount of extinction by the extinction means is made adjusted so that it may become the calculated amount of target extinction, it becomes possible only by inputting the form to adjust the amount of incidence to a light-receiving means to a setting proper amount. Therefore, it becomes possible to change the amount of incidence of a light-receiving means according to measurement conditions, attaining easy-ization of the actuation for changing the amount of incidence of a light-receiving means.

[0018] According to invention according to claim 3, said floodlighting means and said light-receiving means are constituted free [justification] in one, and based on the magnitude information on said measured object, that light should be irradiated with said floodlighting means focusing on the central part of said measured object at said measured object, said control means is constituted so that the location of said floodlighting means and said light-receiving means may be adjusted.

[0019] Namely, if the magnitude of a measured object changes, the light from a floodlighting means turns for example, and direct incidence is carried out to a light-receiving means Since there is a possibility that the light around which it turned may serve as a noise, and an S/N (signal-to-noise) ratio may become small, even if the magnitude of a measured object changes, to irradiate a measured object focusing on the central part of a measured object is desired that a surroundings lump of the light from a floodlighting means should be prevented. And according to invention according to claim 3, based on the magnitude information on a measured object, a control means so that light may be irradiated with a floodlighting means focusing on the central part of a measured object at a measured object Since the location of a floodlighting means and a light-receiving means is made adjusted, even if the magnitude of a measured object changes, it becomes possible to irradiate light at a measured object focusing on the central part of a measured object. Therefore, even if the magnitude of a measured object changes, it becomes possible to prevent that the light from a floodlighting means turns around a measured object, and carries out direct incidence to a light-receiving means, and it becomes possible to measure the internal quality of a measured object with a sufficient precision.

[0020] According to invention according to claim 4, said floodlighting means irradiates beam light at said measured object, and the exposure range by the beam light is constituted, enabling free modification, and based on the magnitude information on said measured object, said exposure range is large, and if possible, said control means is constituted so that the exposure range by said beam light may be adjusted, so that the magnitude of the measured object is large.

[0021] That is, since it becomes possible to make the exposure range by beam light adjust as the exposure range by beam light becomes large so that the magnitude of the measured object is [a control

means] large based on the magnitude information on a measured object, even if the magnitude of a measured object changes, it becomes possible to make light irradiate homogeneity from a floodlighting means over the whole measured object. Therefore, since the transmitted light or the reflected light from a measured object which carries out incidence to a light-receiving means becomes what is reflecting the internal quality of a measured object in homogeneity over the whole and becomes possible [analyzing the internal quality of a measured object] based on the transmitted light or the reflected light from the measured object, it becomes possible [measuring the internal quality of a measured object with a sufficient precision].

[0022] While a collaboration operation with claim 3 adjusts the location of a floodlighting means and said light-receiving means so that a control means may irradiate light with a floodlighting means focusing on the central part of a measured object at a measured object according to the magnitude of a measured object According to the magnitude of a measured object, as the exposure range by beam light becomes large, it becomes possible to adjust the exposure range by beam light, so that the magnitude of the measured object is large. Therefore, it becomes possible to make it to turn around a measured object irradiate homogeneity over the whole measured object focusing on the central part of a measured object, while becoming possible to prevent exactly of the light from a floodlighting means, while, and it becomes possible [measuring the internal quality of a measured object with a much more sufficient precision].

[0023] Two or more extinction objects with which the amounts of extinction of said transmitted light or said reflected light differ [said extinction means] according to invention according to claim 5, The extinction object of these plurality is established, and have the body of revolution which can be rotated freely and it is constituted. said two or more extinction objects -- from the core of said body of revolution -- etc. -- it is prepared in said body of revolution in distance or the condition of separating spacing to a hoop direction mostly in the location of **** distance, and said control means carries out rotation actuation of said body of revolution, and it is constituted so that the amount of extinction by said extinction means may be made to change.

[0024] Namely, two or more extinction objects with which the amounts of extinction of the transmitted light or said reflected light differ from the core of body of revolution -- etc., since it is prepared in said body of revolution in distance or the condition of separating spacing to a hoop direction mostly in the location of **** distance, a control means carries out rotation actuation of the body of revolution and the amount of extinction by the extinction means is made changed For example, it has two or more extinction objects with which the amounts of extinction of the transmitted light or the reflected light differ. Separate the extinction object of these plurality to the longitudinal direction of a slide mobile, and spacing is arranged. It compares with the thing which carries out slide migration of the slide mobile, and makes the amount of extinction by the extinction means change. Without receiving friction at the time of a slide mobile carrying out slide migration etc., it becomes possible to make the amount of extinction by the extinction means change, and it becomes possible to attain easy-ization of modification actuation of the amount of extinction by the extinction means.

[0025]

[Embodiment of the Invention] About the spectral-analysis equipment concerning this invention, it prepares for the fruit-sorting facility which performs sorting classification of a mandarin orange as a measured object, and the case where it applies to the configuration which measures the internal quality information of a mandarin orange, i.e., a sugar content, acidity, etc., is explained based on a drawing.

[0026] the floodlighting section 1 as a floodlighting means by which this spectral-analysis equipment irradiates light at the measured object M (mandarin orange) as shown in drawing 1 , and the light, in which the measured object M was penetrated -- a spectrum -- carrying out -- that light that carried out the spectrum -- receiving light -- a spectrum -- it has the light sensing portion 2 which obtains spectrum data, the control section 3 as a control means which controls actuation of each part, etc., and is constituted. And the measured object M has become column-like at the setting rate by conveyance conveyor 4 at the single tier with the configuration by which installation conveyance is carried out, and it is constituted so that it may pass through the part for measurement by this spectral-analysis equipment

one by one. Moreover, after the light projected from the floodlighting section 1 penetrates the measured object M to the measured object M located in the part for measurement, in the condition that light is received by the light sensing portion 2, the floodlighting section 1 and a light sensing portion 2 distribute to the right-and-left both-sides part of the part for measurement, and are arranged.

[0027] Said floodlighting section 1 is equipped with the beam light source 6 which irradiates beam light at the measured object M, and consists of power supplied from a power circuit 5, and the beam light source 6 is constituted free [modification of the exposure range by beam light]. And the shutter device 9 which can be freely switched to the condition that the beam light from the beam light source 6 is irradiated by the part for measurement, and the condition of intercepting light is established.

[0028] The condenser lenses 10a and 10b which condense the light which penetrated the measured object M in said light sensing portion 2, Carry out extinction of the transmitted light from the measured object M, and it considers as an extinction means by which the amount of extinction can be adjusted freely. The reflecting mirror 11 which reflects upward the light by which extinction was carried out by the ****** device 7 and the extinction device 7, the color filter 12 which passes only the light of a wavelength field for measurement which is mentioned later, and the shutter device 13 which can be freely switched to the open condition of passing light, and the closed state which intercepts light, if incidence of the light which passed the shutter device 13 of an open condition is carried out -- the light -- a spectrum -- carrying out -- said spectrum -- it has the spectroscope 14 which measures spectrum data, and is constituted. And a reflecting mirror 11, condenser lens 10b, a color filter 12, a shutter device, a spectroscope 14, etc. act as a light-receiving means 8, and the extinction device 7 is arranged between condenser lens 10a and a reflecting mirror 11, and is arranged between the light-receiving means 8 and the measured object M.

[0029] Said extinction device 7 is equipped with two or more extinction objects 25 with which the amounts of extinction of the transmitted light from the measured object M differ as shown in drawing 3 , and the body of revolution 26 in which the extinction object 25 of these plurality is formed and which can be rotated, and is constituted, and two or more extinction objects 25 are formed in body of revolution 26 from the core of body of revolution 26 in the equal distance or the condition of separating spacing to a hoop direction mostly in an equidistant location. And it is constituted so that rotation actuation of the body of revolution 26 may be carried out and the amount of extinction by the extinction device 7 may be changed.

[0030] If it explains concretely, 1st extinction object 25a which consists of circular opening, 2nd extinction object 25b which consists of an ND filter 10%, 3rd extinction object 25c which consists of an ND filter 1%, and the 25d of the 4th extinction objects which consist of an ND filter 0.1% are mostly prepared in the hoop direction in the equal distance or the condition of separating spacing, from the core in the equidistant location at body of revolution 26. And by forming the electric motor 27 for rotating body of revolution 26, making the electric motor 27 drive, and carrying out rotation actuation of the body of revolution 26, it is constituted so that the extinction object 25 which dims the transmitted light from the measured object M may be made to change and the amount of extinction by the extinction device 7 may be changed.

[0031] The reflecting mirror 16 which reflects the light which carried out incidence from ON **** 15 as said spectroscope 14 is shown in drawing 4 , It consists of photo sensors 18 which measure spectrum data. detecting the optical reinforcement for every wavelength in which the spectrum was carried out by the concave grating 17 which carries out the spectrum of the reflected light to the light of two or more wavelength, and the concave grating 17 -- a spectrum -- It is arranged in the black box 19 with which these reflecting mirrors 16, a concave grating 17, and a photo sensor 18 consist of a protection-from-light nature ingredient which shades the light from the outside.

[0032] Said photo sensor 18 consists of 1024-bit MOS mold line sensors which change and output the transmitted light by which the part light reflex was carried out by the concave grating 17 to the signal for every wavelength while receiving light for every wavelength to coincidence. And although a detailed explanation is not carried out, this line sensor carries out the interior of the drive circuit for making the capacitor which accumulates the charge obtained in optoelectric transducers, such as a photodiode, and

the optoelectric transducer of those for every unit pixel, and its stored charge output outside etc., and is constituted. In addition, this line sensor can detect now the light of the wavelength of the range of 700nm - 1100nm.

[0033] Said floodlighting section 1 and light sensing portion 2 are prepared in the condition of being supported in one with the frame 20 prepared so that the upper part side of the part for measurement through which the measured object M passes might be bypassed. And this frame 20 is constituted so that modification accommodation of the location of the vertical direction of that whole can be carried out to the conveyance conveyor 4 by the vertical regulatory mechanism 21, and the floodlighting section 1 and a light sensing portion 2, i.e., the floodlighting section 1 and the light-receiving means 8, are constituted free [justification of the vertical direction] in one.

[0034] Although a detailed explanation is not carried out about said vertical regulatory mechanism 21, it is installed in the state of location immobilization to a fixed part F, and it is constituted so that it can be made to move up and down by screw delivery device 21b driven in electric motor 21a. And you make it located in the upper part side of the passage part of the measured object M in the conveyance conveyor 4, and the reference filter 22 which is an example of a criteria object is formed in the condition that location immobilization is carried out, by said fixed part F. This reference filter 22 consists of light filters which have a predetermined absorbance property, and, specifically, is constituted using opal glass.

[0035] As by carrying out centering control of said whole frame 20 in the vertical direction shows to (b) of drawing 5 As it is indicated in (b) of drawing 5 as the usual measurement condition received by the light sensing portion 2 after the light from the floodlighting section 1 penetrates the measured object M laid in the conveyance conveyor 4 After the light from each floodlighting section 1 penetrates said reference filter 22, it is constituted so that it can switch to the reference measurement condition received by the light sensing portion 2.

[0036] And said conveyance conveyor 4 has the composition of driving endless rotation band 4a by electric motor 4b, and it has the rotary encoder 23 which detects the rotation condition of the revolving shaft of body-of-revolution 4c which winds that endless rotation band 4a, and it has the composition that the detection information on this rotary encoder 23 is also inputted into a control section 3. Furthermore, as shown in drawing 7 , the conveyance direction superior side part of said part for measurement by the conveyance conveyor 4 is equipped with the optical passage sensor 24 which detects passage of the measured object M. Photogenic organ 24a which emits light, and electric-eye 24b which receives that light this passage sensor 24 it distributes to the right-and-left both-sides section of the conveyance path by the conveyance conveyor 4, and is arranged, if the light which the measured object M did not exist but emitted light from photogenic organ 24a is received in electric-eye 24b, it will be in an OFF state, and light is interrupted by the measured object M, and light receives light in electric-eye 24b -- it has -- it can kick and will be in an ON state.

[0037] Said control section 3 is constituted using the microcomputer, and as shown in drawing 6 , it is constituted so that actuation of each part, such as a switching action of the shutter device of adjustment [of the exposure range of the beam light by the beam light source 6 of the floodlighting section 1], floodlighting section 1, and light sensing portion 2 each, actuation of the vertical regulatory mechanism 21, and adjustment of the amount of extinction by the extinction device 7, may be controlled. Moreover, the control section 3 is constituted so that data processing which analyzes the internal quality of the measured object M may be performed based on the measurement result obtained with the spectroscope 14.

[0038] Next, the control action by the control section 3 is explained. Said control section 3 is usually constituted free [a switch in data measurement mode] with criteria data measurement mode. the spectrum which said criteria data measurement mode was performed in advance of the usual measurement to the measured object M, and replaced the light from the floodlighting section 1 with the measured object M, irradiated said reference filter 22, carried out the spectrum of the transmitted light from the reference filter 22 by the light sensing portion 2, received the light which carried out the spectrum, and was obtained -- spectrum data -- criteria -- a spectrum -- it is constituted so that it may ask

as spectrum data. moreover, said measured object M by which data measurement mode is usually conveyed by conveyance conveyor 4 -- receiving -- the floodlighting section 1 to light -- irradiating -- measurement -- a spectrum -- spectrum data -- obtaining -- this measurement -- a spectrum -- spectrum data and criteria -- a spectrum -- based on spectrum data, it is constituted so that the internal quality of the measured object M may be analyzed.

[0039] About each above-mentioned mode, explanation is added hereafter. First, in criteria data measurement mode, it is in the condition of stopping conveyance of the measured object M by the conveyance conveyor 4, and the vertical regulatory mechanism 21 is operated and said frame 20 is switched to said reference measurement condition. and the spectrum which switched each shutter device to the open condition, replaced the light from the floodlighting section 1 with the measured object M, irradiated said reference filter 22, carried out the spectrum of the transmitted light from the reference filter 22 by the light sensing portion 2, received the light which carried out the spectrum, and was obtained -- spectrum data -- criteria -- a spectrum -- it measures as spectrum data.

[0040] And in criteria data measurement mode, the detection value (dark current data) of the photo sensor 18 in the non-light condition that the light to a light sensing portion 2 was intercepted is also measured. That is, he switches the shutter device of said light sensing portion 2 to a closed state, and is trying to calculate the detection value in every unit pixel of the photo sensor 18 at that time as dark current data.

[0041] next -- whenever it conveys the object M measured [this / operate / in / usually / data measurement mode / the vertical regulatory mechanism 21, usually switch a frame 20 to a measurement condition, and according to the conveyance conveyor 4] and each ******** M passes through the part for measurement -- each measurement -- a spectrum -- spectrum data are measured. In addition, the exposure of the light which irradiates the measured object M from the beam light source 6 in the floodlighting means 1, and charge accumulation-of-electricity time amount of a line sensor are made into the set-up constant value.

[0042] And that a control section 3 should irradiate light in the floodlighting section 1 focusing on the central part of the measured object M at the measured object M based on the magnitude information on the measured object M inputted beforehand, while making the location of the vertical direction of the floodlighting section 1 and a light sensing portion 2 adjust It is constituted so that the magnitude of the measured object M is large, and the exposure range of the beam light by the beam light source 6 may become large, and the exposure range by beam light may be adjusted.

[0043] That is, when the magnitude of the measured object M is small, he operates the vertical regulatory mechanism 21 and the beam light source 6, and is trying to adjust the location of the vertical direction of the floodlighting section 1 and a light sensing portion 2, and the exposure range of beam light so that beam light may be irradiated by homogeneity over the whole measured object M focusing on the central part of the measured object M as shown in (b) of drawing 2 . And when the magnitude of the measured object M is large, the floodlighting section 1 and a light sensing portion 2 are moved to an upper part side by the vertical regulatory mechanism 21, and he operates the beam light source 6, and is trying to adjust the exposure range of beam light so that beam light may be irradiated by homogeneity over the whole measured object M focusing on the central part of the measured object M as shown in (b) of drawing 2 .

[0044] That is, it is constituted so that the location of the vertical direction of the floodlighting section 1 and a light sensing portion 2 and the exposure range of beam light may be adjusted, so that it may make it irradiate homogeneity over the whole measured object M focusing on the central part of the measured object M while the light from the floodlighting section 1 prevents turning around the measured object M exactly, while and.

[0045] moreover, the measurement conditions (for example, the form of the measured object M --) as which a control section 3 is inputted beforehand Based on the measurement conditions of the measured objects M, such as magnitude and permeability, the amount of target extinction for making the amount of incidence to the light-receiving means 8 of the transmitted light from the measured object M into a setting proper amount is calculated, and that it should make the calculated amount of target extinction, it

is constituted so that the amount of extinction by the extinction device 7 may be adjusted. Namely, the amount of target extinction is calculated so that the quantity of light of the transmitted light from the measured object M is large and the amount of target extinction may become large. One extinction object 25 is chosen from two or more extinction objects 25 so that it may become the amount of target extinction which the amount of extinction by the extinction device 7 calculated, and an electric motor 27 is made to drive, and it is constituted so that rotation actuation of the body of revolution 26 may be carried out, so that the transmitted light from the measured object M may be dimmed with the selected extinction object 25.

[0046] If explanation is added, the light from the floodlighting section 2 will be first irradiated by the measured object M. After extinction is carried out by the extinction device 7 as the transmitted light from the measured object M, incidence will be carried out to the light-receiving means 8. It is constituted so that the amount of incidence to the light-receiving means 8 may turn into a setting proper amount and the extinction device 7 may adjust the amount of extinction, just before the transmitted light from the measured object M carries out incidence to the light-receiving means 8. And based on measurement conditions, such as a form of the measured object M, magnitude, and permeability, by adjusting the amount of extinction by the extinction device 7, also corresponding to change of measurement conditions, it is constituted so that the internal quality of the measured object M can be measured with a sufficient precision.

[0047] Moreover, since the extinction device 7 is established between the measured object M and the light-receiving means 8 Even if light other than the transmitted light from the measured object M exists between the measured object M and the light-receiving means 8, extinction of the light other than the transmitted light will be carried out by the extinction device 7, and incidence will be carried out to the light-receiving means 8, and it is constituted so that it may prevent that an S/N (signal-to-noise) ratio becomes small.

[0048] Incidentally, since permeability changes with a form or magnitude, the mandarin orange as a measured object M computes the form of the measured object M, and magnitude and the relation of the average permeability of the measured object M beforehand, and makes the control section 3 memorize the relation beforehand. And he is trying to calculate the amount of target extinction noting that the permeability of the measured object M is computed from the relation memorized, and the quantity of light of the transmitted light from the measured object M will become large so that the permeability is large if the form and magnitude of the measured object M are inputted. In addition, in case the form and magnitude of the measured object M change, he detects measurement conditions while inputting into a control section 3 or conveying the measured object M in the part for measurement by conveyance conveyor 4, before making the measured object M lay in the conveyance conveyor 4, and is trying to input the detected measurement condition into a control section 3 about the measurement conditions inputted beforehand.

[0049] If explanation is added about the concrete processing in an actual activity, the conveyance direction mid gear of each ******** M first conveyed in the part for measurement based on the bearer rate of the conveyance conveyor 4 detected by the rotary encoder 23 and the detection information by said passage sensor 24 will ask for the timing which passes through the part for measurement beforehand. That is, since the output of a passage sensor will switch from an OFF state to an ON state if the measured object M begins to be detected by the passage sensor 24, and it switches from an ON state to an OFF state after the measured object M ends passage, the conveyance direction mid gear of the measured object M can ask for the timing which passes through the part for measurement from the measurement information and information on the bearer rate of the conveyance conveyor 4.

[0050] and -- whenever it sets up time amount until the conveyance direction mid gear of before the setup time to the measured object M carries out setup-time progress from the timing which passes through the part for measurement rather than the timing to which the conveyance direction mid gear of the measured object M passes through the part for measurement with the charge accumulation-of-electricity time amount of a line sensor and each ******** M passes through the part for measurement -- the light income of each photo sensor 18 -- measuring -- measurement -- a spectrum -- he is trying to

measure spectrum data In addition, before measuring the light income of a photo sensor 18, empty reading actuation which carries out empty reading of the detection value of a photo sensor 18 is performed, and you may make it extract the charge which the capacitor has already stored electricity.
[0051] Next, it is constituted so that data processing which analyzes the internal quality of the measured object M using the spectral-analysis technique based on the various data obtained by doing in this way may be performed. namely, measurement -- a spectrum -- spectrum data and criteria -- a spectrum -- while acquiring the quadratic differential value in the wavelength field of the absorbance spectrum for every wavelength by which the spectrum was carried out, and an absorbance spectrum based on spectrum data and dark current data, it is constituted so that analysis data processing which computes the amount of components corresponding to the sugar content contained in the measured object M by the quadratic differential value and the amount of components corresponding to acidity may be performed. an absorbance d -- criteria -- a spectrum -- spectrum data -- Rd and measurement -- a spectrum -- if spectrum data are set to Sd and dark current data are set to Da -- [0052]
[Equation 1]
d=log{(Rd-Da)/(Sd-Da)}
[0053] Coming out and defining, a control section 3 computes the amount of components contained in the measured object M based on the multiple regression analysis by following several 2.
[0054]
[Equation 2]
Y=K0+K1, A(lambda 1) +K2, andA (lambda 2)
[0055] However, Y ; The amounts K0, K1, and K2 of components ; A coefficient A (lambda 1), A (lambda 2) ; quadratic differential value of the absorbance spectrum in the specific wavelength lambda
[0056] In addition, for every component which computes the amount of components, the specific amount formula of components, the specific multipliers K0, K1, and K2, wavelength lambda1 and lambda2, etc. are beforehand set up by the control section 3, it memorizes, and it has at it the composition of computing the amount of components of each component using the specific amount formula of components for every component of this.
[0057] [Another operation gestalt]
(1) Although it constitutes from an above-mentioned operation gestalt so that the amount of target extinction may be calculated and the amount of extinction by the extinction device 7 may be adjusted if possible to the calculated amount of target extinction based on the measurement conditions inputted beforehand For example, it is also possible to constitute and carry out so that the amount of extinction by the extinction device 7 may be adjusted so that the amount of incidence to the light-receiving means 8 may turn into a setting proper amount based on the light income actually received with the photo sensor 18. Moreover, while calculating the amount of target extinction and, adjusting the amount of extinction by the extinction device 7 to the calculated amount of target extinction if possible based on the measurement conditions inputted beforehand It is also possible to constitute so that the amount of extinction by the extinction device 7 may be tuned finely so that the amount of incidence to the light-receiving means 8 may turn into a setting proper amount based on the light income actually received with the photo sensor 18.
[0058] (2) Although two or more extinction objects 25 which can be set in the extinction device 7 showed opening 25a, 10% ND filter25b, 1% ND filter25c, and the example that consists of 25d of ND filters 0.1% with the above-mentioned operation gestalt, as shown in drawing 8 , two or more extinction objects may be constituted from two or more openings 28 from which the opening area formed in body of revolution 26 differs, and may be carried out, for example. incidentally, each of two or more openings 28 is formed circularly -- having -- opening as 1st extinction object 28a -- a diameter -- 10mm -- opening as 2nd extinction object 28b -- a diameter -- 7.5mm -- a diameter is constituted by 5mm and opening as the 28d of the 4th extinction objects is constituted for opening as 3rd extinction object 28c by 2.5mm in the diameter.
[0059] (3) Although the above-mentioned operation gestalt showed the example which is made to carry out rotation actuation of the body of revolution 26 in which two or more extinction objects 25 were

formed, and changes the amount of extinction by the extinction device 7 It is also possible to constitute and carry out so that the amount of extinction by the extinction device 7 may be changed by replacing with this configuration, establishing two or more extinction objects 25 in the slide migration direction of a slide mobile in the condition of separating spacing, and carrying out slide migration of that slide mobile. Moreover, like the above-mentioned operation gestalt, it is not restricted to four, and according to measurement conditions etc., it changes into two, three, and five or more suitably, and the number of the extinction objects 25 can be carried out.

[0060] (4) Although the exposure of the light which irradiates the measured object M from the beam light source 6 in the floodlighting means 1, and charge accumulation-of-electricity time amount of a line sensor are made into the set-up constant value with the above-mentioned operation gestalt For example, you may make it change both the exposure of the light which irradiates the measured object M from the beam light source 6 in the floodlighting means 1, and both [either or] of charge accumulation-of-electricity time amount according to measurement conditions, such as a form of the measured object M, and magnitude. When explanation is added and it is the measurement conditions to which the amount of incidence to the light-receiving means 8 becomes small Make larger than the set point the exposure of the light which irradiates the measured object M, or charge accumulation-of-electricity time amount of a line sensor is made longer than the set point. On the contrary, when it is the measurement conditions to which the amount of incidence to the light-receiving means 8 becomes large, the exposure of the light which irradiates the measured object M is made smaller than the set point, or charge accumulation-of-electricity time amount of a line sensor is made shorter than the set point.

[0061] (5) Although the floodlighting section 1 and a light sensing portion 2 were constituted from an above-mentioned operation gestalt according to the magnitude of the measured object M so that the location of the vertical direction might be adjusted It is also possible to constitute the floodlighting section 1 and a light sensing portion 2 for the location of the both directions of the vertical direction and a longitudinal direction, enabling free adjustment, and to carry them out according to the magnitude of the measured object M, corresponding to the magnitude of the measured object M in to constitute the floodlighting section 1 and a light sensing portion 2 for a lateral location, enabling free adjustment ****. Moreover, it is also possible to carry out by making the location of the floodlighting section 1 and a light sensing portion 2 into a fixed position irrespective of the magnitude of the measured object M.

[0062] (6) Although the beam light source 6 which irradiates beam light and can change the exposure range by the beam light freely was used for the measured object M as a floodlighting means with the above-mentioned operation gestalt The reflecting plate of the concave surface configuration reflected towards a lower part side so that the light which replaces with this configuration, for example, emits light from a halogen lamp and this halogen lamp may be made to condense, It is also possible to prepare the reflecting mirror sideways changed towards the measured object M which reflects the reflected light by the reflecting plate, and is located in the part for measurement, to constitute and to carry out light which emits light from a halogen lamp so that the measured object M may be irradiated. Moreover, various kinds of things, such as not only a halogen lamp but a mercury-vapor lamp and Ne discharge tube, can be adapted in this case.

[0063] (7) With the above-mentioned operation gestalt, although the filter by opal glass was used as a criteria object, the quality of the material is not limited that what is necessary is just what has a predetermined absorbance property besides diffusion plates, such as not only this but an obscured glass. Moreover, you may make it a light-receiving means also use other detection means, such as not only an MOS mold line sensor but a CCD mold line sensor.

[0064] (8) the above-mentioned operation gestalt -- the transmitted light from the measured object M -- being based -- a spectrum -- although it constituted so that a spectrum might be measured -- this configuration -- replacing with -- the reflected light from the measured object M -- being based -- a spectrum -- it is also possible to constitute and carry out so that a spectrum may be measured.

[0065] (9) With the above-mentioned operation gestalt, as internal quality of the measured object M, although a sugar content and acidity were illustrated, the other internal quality, such as information not only on this but a flavor, may be measured.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] A floodlighting means irradiate light at the measured object located in the part for measurement, a light-receiving means carry out the spectrum of the transmitted light or the reflected light from said measured object, and receive the light by which the spectrum was carried out, and the control means that control actuation of each part are established, and this invention relates to the spectral-analysis equipment constituted by the light which said control means received with said light-receiving means so that the internal quality of said measured object may analyze.

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PRIOR ART

[Description of the Prior Art] The above spectral-analysis equipments For example, after carrying out the spectrum of the transmitted light or the reflected light from a measured object in a concave grating, The line sensor of the charge accumulation-of-electricity type which arranged in in the shape of an array the photo detector which consists of two or more optoelectric transducers etc. is used as a light-receiving means. the spectrum measured with such a light-receiving means -- the spectrum measured with a light-receiving means since the internal quality of measured objects, such as garden stuff, is reflected in spectrum data -- based on spectrum data, it is used in order to analyze the internal quality of measured objects, such as garden stuff.

[0003] Although it is necessary to make the amount of charge accumulation of electricity of a line sensor into a proper amount with this kind of spectral-analysis equipment, for example in order to analyze the internal quality of a measured object with a sufficient precision when the line sensor of a charge accumulation-of-electricity type is used as a light-receiving means Since the amount of incidence to a light-receiving means will change and the amount of charge accumulation of electricity of a line sensor will change with measurement conditions, such as a form of a measured object, and magnitude, etc. in connection with it, to adjust the amount of incidence to a light-receiving means is desired so that the amount of charge accumulation of electricity of a line sensor may turn into a proper amount. If explanation is added, in order that the quantity of light of the transmitted light from a measured object or the reflected light may change, the amount of incidence to a light-receiving means will change with measurement conditions, such as a form of a measured object, and magnitude, etc., but when the amount of incidence to a light-receiving means changes and the amount of incidence to the light-receiving means becomes larger than a setting proper amount, there is a possibility that the charge accumulated dose of a line sensor may be saturated exceeding the maximum accumulated dose. Moreover, when the amount of incidence to a light-receiving means changes and the amount of incidence to the light-receiving means becomes smaller than a setting proper amount conversely, there is a possibility that the charge accumulated dose of a line sensor may be insufficient, an S/N (signal-to-noise) ratio may fall, and a measurement error may become large. In order to measure the internal quality of a measured object with a sufficient precision with this kind of spectral-analysis equipment like the above, to make the amount of incidence to a light-receiving means into a setting proper amount is desired.

[0004] Then, conventional spectral-analysis equipment is made to make the amount of incidence to a light-receiving means a setting proper amount by adjusting the quantity of light irradiated by the measured object from a floodlighting means. If it explains concretely, the extinction means to which extinction of the light from a floodlighting means is carried out establishes between a floodlighting means and a measured object, and constitute, or a control means constitutes so that the amount of incidence to a light-receiving means may turn into a setting proper amount, and the amount of floodlighting from a floodlighting means may be adjusted, so that the amount of incidence to a light-receiving means may turn into a setting proper amount and a control means may adjust the amount of extinction by the extinction means.

[0005] If it explains concretely, when measurement conditions are measurement conditions to which the

quantity of light of the transmitted light from a measured object or the reflected light becomes small Measurement conditions make the amount of extinction by the extinction means smaller than the time of being the measurement conditions to which the quantity of light of the transmitted light from a measured object or the reflected light becomes large, or Or it adjusts to the side to which the quantity of light of the transmitted light from a measured object or the reflected light increases by enlarging the amount of floodlighting from a floodlighting means. Sometimes measurement conditions to which it is made to become a setting proper amount, and the quantity of light of the transmitted light from a measured object or the reflected light becomes [measurement conditions] large conversely the amount of incidence to a light-receiving means Measurement conditions make the amount of extinction by the extinction means larger than the time of being the measurement conditions to which the quantity of light of the transmitted light from a measured object or the reflected light becomes small, or Or it adjusts to the side to which the quantity of light of the transmitted light from a measured object or the reflected light decreases, and the amount of incidence to a light-receiving means is made to become a setting proper amount by making small the amount of floodlighting from a floodlighting means.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] In the above-mentioned conventional thing, since the quantity of light irradiated by the measured object from a floodlighting means is adjusted, the light with which the light from a floodlighting means will be irradiated by the measured object, and was irradiated by the measured object after the quantity of light was adjusted turns into the transmitted light from a measured object, or the reflected light, and incidence will be carried out to a light-receiving means.
[0007] Therefore, since the permeability or reflection factor of a measured object will be reflected as it is, the quantity of light by which incidence is carried out to a light-receiving means for example, in being larger than the value which the permeability or reflection factor of a measured object assumes The amount of incidence to a light-receiving means becomes larger than a setting proper amount, and in being smaller than the value which the permeability or reflection factor of a measured object assumes conversely, the amount of incidence to a light-receiving means becomes smaller than a setting proper amount, and there is a possibility that the amount of incidence to a light-receiving means cannot adjust to a setting proper amount. Even if it adjusts the quantity of light irradiated by the measured object from a floodlighting means like the above-mentioned conventional thing like the above, the amount of incidence to a light-receiving means cannot necessarily be adjusted to a setting proper amount, but there is a possibility that the internal quality of a measured object may be immeasurable with a sufficient precision.
[0008] Moreover, since a measured object irradiates and the transmitted light or the reflected light from the measured object carries out incidence to a light-receiving means in the above-mentioned conventional thing after the light from a floodlighting means adjusts the quantity of light For example, if light other than the transmitted light from a measured object or the reflected light exists between a measured object and a light-receiving means Incidence will be carried out to a light-receiving means, an S/N (signal-to-noise) ratio becomes small, without carrying out extinction of the light other than the transmitted light or the reflected light, and there is a possibility that the internal quality of a measured object may be immeasurable with a sufficient precision.
[0009] This invention is made paying attention to this point, and adjusting the amount of incidence to a light-receiving means to a setting proper amount, the purpose prevents that an S/N (signal-to-noise) ratio becomes small, and is in the point of offering the spectral-analysis equipment which becomes possible [measuring the internal quality of a measured object with a sufficient precision].

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MEANS

[Means for Solving the Problem] A floodlighting means to irradiate light at the measured object located in the part for measurement according to invention according to claim 1 in order to attain this purpose, By the light which the spectrum of the transmitted light or the reflected light from said measured object was carried out, a light-receiving means to receive the light by which the spectrum was carried out, and the control means which controls actuation of each part were established, and said control means received with said light-receiving means In the spectral-analysis equipment constituted so that the internal quality of said measured object may be analyzed Between said measured objects and said light-receiving means, carry out extinction of said transmitted light or said reflected light, and an extinction means by which the amount of extinction can be adjusted freely is established. Said control means is constituted so that the amount of incidence to said light-receiving means of said transmitted light or said reflected light may, if possible, adjust the amount of extinction by said extinction means to a setting proper amount.
[0011] Namely, the extinction means in which the amount adjustment of extinction of the transmitted light or the reflected light from a measured object is free is established between a measured object and a light-receiving means, and a control means so that the amount of incidence to the light-receiving means of the transmitted light from a measured object or the reflected light may turn into a setting proper amount Since the amount of extinction by the extinction means will be adjusted, after the light from a floodlighting means is irradiated by the measured object and extinction is first carried out with an extinction means as the transmitted light or the reflected light from the measured object, incidence of it will be carried out to a light-receiving means. Therefore, although the permeability or reflection factor of a measured object will be reflected as it is, since the quantity of light which carries out incidence to an extinction means is adjusted so that the amount of incidence to a light-receiving means may turn into a setting proper amount with an extinction means, it becomes possible to make the amount of incidence to a light-receiving means adjust to a setting proper amount of it.
[0012] Moreover, since the extinction means is established between the measured object and the light-receiving means, even if light other than the transmitted light from a measured object or the reflected light exists between a measured object and a light-receiving means, extinction of the light other than the transmitted light or the reflected light will be carried out with an extinction means, incidence will be carried out to a light-receiving means, and it will become possible to prevent that an S/N (signal-to-noise) ratio becomes small.
[0013] When the above thing was summarized, according to invention according to claim 1, adjusting the amount of incidence to a light-receiving means to a setting proper amount, it prevents that an S/N (signal-to-noise) ratio becomes small, and was able to come to offer the spectral-analysis equipment which becomes possible [measuring the internal quality of a measured object with a sufficient precision].
[0014] According to invention according to claim 2, based on the measurement conditions inputted beforehand, said control means calculates the amount of target extinction for making the amount of incidence to said light-receiving means of said transmitted light or said reflected light into a setting

proper amount, and that it should make the calculated amount of target extinction, it is constituted so that the amount of extinction by said extinction means may be adjusted.
[0015] Namely, since the quantity of light of the transmitted light from a measured object or the reflected light will change and the amount of incidence to a light-receiving means will generally change according to measurement conditions, such as a form of a measured object, magnitude, permeability, or a reflection factor In order to measure the internal quality of a measured object with a sufficient precision, according to measurement conditions, such as a form of a measured object, magnitude, permeability, or a reflection factor, to make the amount of incidence to the light-receiving means of the transmitted light or the reflected light change is desired.
[0016] And the amount of incidence which actually carried out incidence to the light-receiving means in order to meet the request is detected. When a control means calculates the amount of target extinction for making the amount of incidence to a light-receiving means into a setting proper amount based on the detected amount of incidence, and it constitutes so that it may be made the calculated amount of target extinction and the amount of extinction by the extinction means may be adjusted The amount of incidence by which incidence was actually carried out to the light-receiving means is detected, and it becomes possible to adjust the amount of extinction by the extinction means so that it may become the amount of target extinction calculated based on the detected amount of incidence. However, if a floodlighting means is operated and incidence of the transmitted light or the reflected light from a measured object is not once carried out to a light-receiving means in an above-mentioned thing, since the amount of incidence to a light-receiving means cannot be adjusted to a setting proper amount For example, since a floodlighting means will be operated whenever the form of a measured object changes, and incidence of the transmitted light or the reflected light from a measured object will be once carried out to a light-receiving means, there is a possibility that the actuation for adjusting the amount of incidence to a light-receiving means to a setting proper amount may become troublesome.
[0017] The form of the measured object into which a control means is beforehand inputted to it according to invention according to claim 2, Based on measurement conditions, such as magnitude, permeability, or a reflection factor, the amount of target extinction is calculated so that the permeability or reflection factor of a measured object is large and the amount of target extinction may become large. Even if the form of a measured object changes and it does not operate a floodlighting means, for example since the amount of extinction by the extinction means is made adjusted so that it may become the calculated amount of target extinction, it becomes possible only by inputting the form to adjust the amount of incidence to a light-receiving means to a setting proper amount. Therefore, it becomes possible to change the amount of incidence of a light-receiving means according to measurement conditions, attaining easy-ization of the actuation for changing the amount of incidence of a light-receiving means.
[0018] According to invention according to claim 3, said floodlighting means and said light-receiving means are constituted free [justification] in one, and based on the magnitude information on said measured object, that light should be irradiated with said floodlighting means focusing on the central part of said measured object at said measured object, said control means is constituted so that the location of said floodlighting means and said light-receiving means may be adjusted.
[0019] Namely, if the magnitude of a measured object changes, the light from a floodlighting means turns for example, and direct incidence is carried out to a light-receiving means Since there is a possibility that the light around which it turned may serve as a noise, and an S/N (signal-to-noise) ratio may become small, even if the magnitude of a measured object changes, to irradiate a measured object focusing on the central part of a measured object is desired that a surroundings lump of the light from a floodlighting means should be prevented. And according to invention according to claim 3, based on the magnitude information on a measured object, a control means so that light may be irradiated with a floodlighting means focusing on the central part of a measured object at a measured object Since the location of a floodlighting means and a light-receiving means is made adjusted, even if the magnitude of a measured object changes, it becomes possible to irradiate light at a measured object focusing on the central part of a measured object. Therefore, even if the magnitude of a measured object changes, it

becomes possible to prevent that the light from a floodlighting means turns around a measured object, and carries out direct incidence to a light-receiving means, and it becomes possible to measure the internal quality of a measured object with a sufficient precision.
[0020] According to invention according to claim 4, said floodlighting means irradiates beam light at said measured object, and the exposure range by the beam light is constituted, enabling free modification, and based on the magnitude information on said measured object, said exposure range is large, and if possible, said control means is constituted so that the exposure range by said beam light may be adjusted, so that the magnitude of the measured object is large.
[0021] That is, since it becomes possible to make the exposure range by beam light adjust as the exposure range by beam light becomes large so that the magnitude of the measured object is [a control means] large based on the magnitude information on a measured object, even if the magnitude of a measured object changes, it becomes possible to make light irradiate homogeneity from a floodlighting means over the whole measured object. Therefore, since the transmitted light or the reflected light from a measured object which carries out incidence to a light-receiving means becomes what is reflecting the internal quality of a measured object in homogeneity over the whole and becomes possible [analyzing the internal quality of a measured object] based on the transmitted light or the reflected light from the measured object, it becomes possible [measuring the internal quality of a measured object with a sufficient precision].
[0022] While a collaboration operation with claim 3 adjusts the location of a floodlighting means and said light-receiving means so that a control means may irradiate light with a floodlighting means focusing on the central part of a measured object at a measured object according to the magnitude of a measured object According to the magnitude of a measured object, as the exposure range by beam light becomes large, it becomes possible to adjust the exposure range by beam light, so that the magnitude of the measured object is large. Therefore, it becomes possible to make it to turn around a measured object irradiate homogeneity over the whole measured object focusing on the central part of a measured object, while becoming possible to prevent exactly of the light from a floodlighting means, while, and it becomes possible [measuring the internal quality of a measured object with a much more sufficient precision].
[0023] Two or more extinction objects with which the amounts of extinction of said transmitted light or said reflected light differ [said extinction means] according to invention according to claim 5, The extinction object of these plurality is established, and have the body of revolution which can be rotated freely and it is constituted. said two or more extinction objects -- from the core of said body of revolution -- etc. -- it is prepared in said body of revolution in distance or the condition of separating spacing to a hoop direction mostly in the location of **** distance, and said control means carries out rotation actuation of said body of revolution, and it is constituted so that the amount of extinction by said extinction means may be made to change.
[0024] Namely, two or more extinction objects with which the amounts of extinction of the transmitted light or said reflected light differ from the core of body of revolution -- etc., since it is prepared in said body of revolution in distance or the condition of separating spacing to a hoop direction mostly in the location of **** distance, a control means carries out rotation actuation of the body of revolution and the amount of extinction by the extinction means is made changed For example, it has two or more extinction objects with which the amounts of extinction of the transmitted light or the reflected light differ. Separate the extinction object of these plurality to the longitudinal direction of a slide mobile, and spacing is arranged. It compares with the thing which carries out slide migration of the slide mobile, and makes the amount of extinction by the extinction means change. Without receiving friction at the time of a slide mobile carrying out slide migration etc., it becomes possible to make the amount of extinction by the extinction means change, and it becomes possible to attain easy-ization of modification actuation of the amount of extinction by the extinction means.
[0025]
[Embodiment of the Invention] About the spectral-analysis equipment concerning this invention, it prepares for the fruit-sorting facility which performs sorting classification of a mandarin orange as a

measured object, and the case where it applies to the configuration which measures the internal quality information of a mandarin orange, i.e., a sugar content, acidity, etc., is explained based on a drawing.
[0026] the floodlighting section 1 as a floodlighting means by which this spectral-analysis equipment irradiates light at the measured object M (mandarin orange) as shown in drawing 1 , and the light, in which the measured object M was penetrated -- a spectrum -- carrying out -- that light that carried out the spectrum -- receiving light -- a spectrum -- it has the light sensing portion 2 which obtains spectrum data, the control section 3 as a control means which controls actuation of each part, etc., and is constituted. And the measured object M has become column-like at the setting rate by conveyance conveyor 4 at the single tier with the configuration by which installation conveyance is carried out, and it is constituted so that it may pass through the part for measurement by this spectral-analysis equipment one by one. Moreover, after the light projected from the floodlighting section 1 penetrates the measured object M to the measured object M located in the part for measurement, in the condition that light is received by the light sensing portion 2, the floodlighting section 1 and a light sensing portion 2 distribute to the right-and-left both-sides part of the part for measurement, and are arranged.
[0027] Said floodlighting section 1 is equipped with the beam light source 6 which irradiates beam light at the measured object M, and consists of power supplied from a power circuit 5, and the beam light source 6 is constituted free [modification of the exposure range by beam light]. And the shutter device 9 which can be freely switched to the condition that the beam light from the beam light source 6 is irradiated by the part for measurement, and the condition of intercepting light is established.
[0028] The condenser lenses 10a and 10b which condense the light which penetrated the measured object M in said light sensing portion 2, Carry out extinction of the transmitted light from the measured object M, and it considers as an extinction means by which the amount of extinction can be adjusted freely. The reflecting mirror 11 which reflects upward the light by which extinction was carried out by the ****** device 7 and the extinction device 7, the color filter 12 which passes only the light of a wavelength field for measurement which is mentioned later, and the shutter device 13 which can be freely switched to the open condition of passing light, and the closed state which intercepts light, if incidence of the light which passed the shutter device 13 of an open condition is carried out -- the light -- a spectrum -- carrying out -- said spectrum -- it has the spectroscope 14 which measures spectrum data, and is constituted. And a reflecting mirror 11, condenser lens 10b, a color filter 12, a shutter device, a spectroscope 14, etc. act as a light-receiving means 8, and the extinction device 7 is arranged between condenser lens 10a and a reflecting mirror 11, and is arranged between the light-receiving means 8 and the measured object M.
[0029] Said extinction device 7 is equipped with two or more extinction objects 25 with which the amounts of extinction of the transmitted light from the measured object M differ as shown in drawing 3 , and the body of revolution 26 in which the extinction object 25 of these plurality is formed and which can be rotated, and is constituted, and two or more extinction objects 25 are formed in body of revolution 26 from the core of body of revolution 26 in the equal distance or the condition of separating spacing to a hoop direction mostly in an equidistant location. And it is constituted so that rotation actuation of the body of revolution 26 may be carried out and the amount of extinction by the extinction device 7 may be changed.
[0030] If it explains concretely, 1st extinction object 25a which consists of circular opening, 2nd extinction object 25b which consists of an ND filter 10%, 3rd extinction object 25c which consists of an ND filter 1%, and the 25d of the 4th extinction objects which consist of an ND filter 0.1% are mostly prepared in the hoop direction in the equal distance or the condition of separating spacing, from the core in the equidistant location at body of revolution 26. And by forming the electric motor 27 for rotating body of revolution 26, making the electric motor 27 drive, and carrying out rotation actuation of the body of revolution 26, it is constituted so that the extinction object 25 which dims the transmitted light from the measured object M may be made to change and the amount of extinction by the extinction device 7 may be changed.
[0031] The reflecting mirror 16 which reflects the light which carried out incidence from ON **** 15 as said spectroscope 14 is shown in drawing 4 , It consists of photo sensors 18 which measure spectrum

data. detecting the optical reinforcement for every wavelength in which the spectrum was carried out by the concave grating 17 which carries out the spectrum of the reflected light to the light of two or more wavelength, and the concave grating 17 -- a spectrum -- It is arranged in the black box 19 with which these reflecting mirrors 16, a concave grating 17, and a photo sensor 18 consist of a protection-from-light nature ingredient which shades the light from the outside.

[0032] Said photo sensor 18 consists of 1024-bit MOS mold line sensors which change and output the transmitted light by which the part light reflex was carried out by the concave grating 17 to the signal for every wavelength while receiving light for every wavelength to coincidence. And although a detailed explanation is not carried out, this line sensor carries out the interior of the drive circuit for making the capacitor which accumulates the charge obtained in optoelectric transducers, such as a photodiode, and the optoelectric transducer of those for every unit pixel, and its stored charge output outside etc., and is constituted. In addition, this line sensor can detect now the light of the wavelength of the range of 700nm - 1100nm.

[0033] Said floodlighting section 1 and light sensing portion 2 are prepared in the condition of being supported in one with the frame 20 prepared so that the upper part side of the part for measurement through which the measured object M passes might be bypassed. And this frame 20 is constituted so that modification accommodation of the location of the vertical direction of that whole can be carried out to the conveyance conveyor 4 by the vertical regulatory mechanism 21, and the floodlighting section 1 and a light sensing portion 2, i.e., the floodlighting section 1 and the light-receiving means 8, are constituted free [justification of the vertical direction] in one.

[0034] Although a detailed explanation is not carried out about said vertical regulatory mechanism 21, it is installed in the state of location immobilization to a fixed part F, and it is constituted so that it can be made to move up and down by screw delivery device 21b driven in electric motor 21a. And you make it located in the upper part side of the passage part of the measured object M in the conveyance conveyor 4, and the reference filter 22 which is an example of a criteria object is formed in the condition that location immobilization is carried out, by said fixed part F. This reference filter 22 consists of light filters which have a predetermined absorbance property, and, specifically, is constituted using opal glass.

[0035] As by carrying out centering control of said whole frame 20 in the vertical direction shows to (b) of drawing 5 As it is indicated in (b) of drawing 5 as the usual measurement condition received by the light sensing portion 2 after the light from the floodlighting section 1 penetrates the measured object M laid in the conveyance conveyor 4 After the light from each floodlighting section 1 penetrates said reference filter 22, it is constituted so that it can switch to the reference measurement condition received by the light sensing portion 2.

[0036] And said conveyance conveyor 4 has the composition of driving endless rotation band 4a by electric motor 4b, and it has the rotary encoder 23 which detects the rotation condition of the revolving shaft of body-of-revolution 4c which winds that endless rotation band 4a, and it has the composition that the detection information on this rotary encoder 23 is also inputted into a control section 3. Furthermore, as shown in drawing 7 , the conveyance direction superior side part of said part for measurement by the conveyance conveyor 4 is equipped with the optical passage sensor 24 which detects passage of the measured object M. Photogenic organ 24a which emits light, and electric-eye 24b which receives that light this passage sensor 24 it distributes to the right-and-left both-sides section of the conveyance path by the conveyance conveyor 4, and is arranged, if the light which the measured object M did not exist but emitted light from photogenic organ 24a is received in electric-eye 24b, it will be in an OFF state, and light is interrupted by the measured object M, and light receives light in electric-eye 24b -- it has -- it can kick and will be in an ON state.

[0037] Said control section 3 is constituted using the microcomputer, and as shown in drawing 6 , it is constituted so that actuation of each part, such as a switching action of the shutter device of adjustment [of the exposure range of the beam light by the beam light source 6 of the floodlighting section 1], floodlighting section 1, and light sensing portion 2 each, actuation of the vertical regulatory mechanism 21, and adjustment of the amount of extinction by the extinction device 7, may be controlled. Moreover,

the control section 3 is constituted so that data processing which analyzes the internal quality of the measured object M may be performed based on the measurement result obtained with the spectroscope 14.

[0038] Next, the control action by the control section 3 is explained. Said control section 3 is usually constituted free [a switch in data measurement mode] with criteria data measurement mode. the spectrum which said criteria data measurement mode was performed in advance of the usual measurement to the measured object M, and replaced the light from the floodlighting section 1 with the measured object M, irradiated said reference filter 22, carried out the spectrum of the transmitted light from the reference filter 22 by the light sensing portion 2, received the light which carried out the spectrum, and was obtained -- spectrum data -- criteria -- a spectrum -- it is constituted so that it may ask as spectrum data. moreover, said measured object M by which data measurement mode is usually conveyed by conveyance conveyor 4 -- receiving -- the floodlighting section 1 to light -- irradiating -- measurement -- a spectrum -- spectrum data -- obtaining -- this measurement -- a spectrum -- spectrum data and criteria -- a spectrum -- based on spectrum data, it is constituted so that the internal quality of the measured object M may be analyzed.

[0039] About each above-mentioned mode, explanation is added hereafter. First, in criteria data measurement mode, it is in the condition of stopping conveyance of the measured object M by the conveyance conveyor 4, and the vertical regulatory mechanism 21 is operated and said frame 20 is switched to said reference measurement condition. and the spectrum which switched each shutter device to the open condition, replaced the light from the floodlighting section 1 with the measured object M, irradiated said reference filter 22, carried out the spectrum of the transmitted light from the reference filter 22 by the light sensing portion 2, received the light which carried out the spectrum, and was obtained -- spectrum data -- criteria -- a spectrum -- it measures as spectrum data.

[0040] And in criteria data measurement mode, the detection value (dark current data) of the photo sensor 18 in the non-light condition that the light to a light sensing portion 2 was intercepted is also measured. That is, he switches the shutter device of said light sensing portion 2 to a closed state, and is trying to calculate the detection value in every unit pixel of the photo sensor 18 at that time as dark current data.

[0041] next -- whenever it conveys the object M measured [this / operate / in / usually / data measurement mode / the vertical regulatory mechanism 21, usually switch a frame 20 to a measurement condition, and according to the conveyance conveyor 4] and each ******** M passes through the part for measurement -- each measurement -- a spectrum -- spectrum data are measured. In addition, the exposure of the light which irradiates the measured object M from the beam light source 6 in the floodlighting means 1, and charge accumulation-of-electricity time amount of a line sensor are made into the set-up constant value.

[0042] And that a control section 3 should irradiate light in the floodlighting section 1 focusing on the central part of the measured object M at the measured object M based on the magnitude information on the measured object M inputted beforehand, while making the location of the vertical direction of the floodlighting section 1 and a light sensing portion 2 adjust It is constituted so that the magnitude of the measured object M is large, and the exposure range of the beam light by the beam light source 6 may become large, and the exposure range by beam light may be adjusted.

[0043] That is, when the magnitude of the measured object M is small, he operates the vertical regulatory mechanism 21 and the beam light source 6, and is trying to adjust the location of the vertical direction of the floodlighting section 1 and a light sensing portion 2, and the exposure range of beam light so that beam light may be irradiated by homogeneity over the whole measured object M focusing on the central part of the measured object M as shown in (b) of drawing 2 . And when the magnitude of the measured object M is large, the floodlighting section 1 and a light sensing portion 2 are moved to an upper part side by the vertical regulatory mechanism 21, and he operates the beam light source 6, and is trying to adjust the exposure range of beam light so that beam light may be irradiated by homogeneity over the whole measured object M focusing on the central part of the measured object M as shown in (b) of drawing 2 .

[0044] That is, it is constituted so that the location of the vertical direction of the floodlighting section 1 and a light sensing portion 2 and the exposure range of beam light may be adjusted, so that it may make it irradiate homogeneity over the whole measured object M focusing on the central part of the measured object M while the light from the floodlighting section 1 prevents turning around the measured object M exactly, while and.
[0045] moreover, the measurement conditions (for example, the form of the measured object M --) as which a control section 3 is inputted beforehand Based on the measurement conditions of the measured objects M, such as magnitude and permeability, the amount of target extinction for making the amount of incidence to the light-receiving means 8 of the transmitted light from the measured object M into a setting proper amount is calculated, and that it should make the calculated amount of target extinction, it is constituted so that the amount of extinction by the extinction device 7 may be adjusted. Namely, the amount of target extinction is calculated so that the quantity of light of the transmitted light from the measured object M is large and the amount of target extinction may become large. One extinction object 25 is chosen from two or more extinction objects 25 so that it may become the amount of target extinction which the amount of extinction by the extinction device 7 calculated, and an electric motor 27 is made to drive, and it is constituted so that rotation actuation of the body of revolution 26 may be carried out, so that the transmitted light from the measured object M may be dimmed with the selected extinction object 25.
[0046] If explanation is added, the light from the floodlighting section 2 will be first irradiated by the measured object M. After extinction is carried out by the extinction device 7 as the transmitted light from the measured object M, incidence will be carried out to the light-receiving means 8. It is constituted so that the amount of incidence to the light-receiving means 8 may turn into a setting proper amount and the extinction device 7 may adjust the amount of extinction, just before the transmitted light from the measured object M carries out incidence to the light-receiving means 8. And based on measurement conditions, such as a form of the measured object M, magnitude, and permeability, by adjusting the amount of extinction by the extinction device 7, also corresponding to change of measurement conditions, it is constituted so that the internal quality of the measured object M can be measured with a sufficient precision.
[0047] Moreover, since the extinction device 7 is established between the measured object M and the light-receiving means 8 Even if light other than the transmitted light from the measured object M exists between the measured object M and the light-receiving means 8, extinction of the light other than the transmitted light will be carried out by the extinction device 7, and incidence will be carried out to the light-receiving means 8, and it is constituted so that it may prevent that an S/N (signal-to-noise) ratio becomes small.
[0048] Incidentally, since permeability changes with a form or magnitude, the mandarin orange as a measured object M computes the form of the measured object M, and magnitude and the relation of the average permeability of the measured object M beforehand, and makes the control section 3 memorize the relation beforehand. And he is trying to calculate the amount of target extinction noting that the permeability of the measured object M is computed from the relation memorized, and the quantity of light of the transmitted light from the measured object M will become large so that the permeability is large if the form and magnitude of the measured object M are inputted. In addition, in case the form and magnitude of the measured object M change, he detects measurement conditions while inputting into a control section 3 or conveying the measured object M in the part for measurement by conveyance conveyor 4, before making the measured object M lay in the conveyance conveyor 4, and is trying to input the detected measurement condition into a control section 3 about the measurement conditions inputted beforehand.
[0049] If explanation is added about the concrete processing in an actual activity, the conveyance direction mid gear of each ******** M first conveyed in the part for measurement based on the bearer rate of the conveyance conveyor 4 detected by the rotary encoder 23 and the detection information by said passage sensor 24 will ask for the timing which passes through the part for measurement beforehand. That is, since the output of a passage sensor will switch from an OFF state to an ON state if

the measured object M begins to be detected by the passage sensor 24, and it switches from an ON state to an OFF state after the measured object M ends passage, the conveyance direction mid gear of the measured object M can ask for the timing which passes through the part for measurement from the measurement information and information on the bearer rate of the conveyance conveyor 4.
[0050] and -- whenever it sets up time amount until the conveyance direction mid gear of before the setup time to the measured object M carries out setup-time progress from the timing which passes through the part for measurement rather than the timing to which the conveyance direction mid gear of the measured object M passes through the part for measurement with the charge accumulation-of-electricity time amount of a line sensor and each ******** M passes through the part for measurement -- the light income of each photo sensor 18 -- measuring -- measurement -- a spectrum -- he is trying to measure spectrum data In addition, before measuring the light income of a photo sensor 18, empty reading actuation which carries out empty reading of the detection value of a photo sensor 18 is performed, and you may make it extract the charge which the capacitor has already stored electricity.
[0051] Next, it is constituted so that data processing which analyzes the internal quality of the measured object M using the spectral-analysis technique based on the various data obtained by doing in this way may be performed. namely, measurement -- a spectrum -- spectrum data and criteria -- a spectrum -- while acquiring the quadratic differential value in the wavelength field of the absorbance spectrum for every wavelength by which the spectrum was carried out, and an absorbance spectrum based on spectrum data and dark current data, it is constituted so that analysis data processing which computes the amount of components corresponding to the sugar content contained in the measured object M by the quadratic differential value and the amount of components corresponding to acidity may be performed. an absorbance d -- criteria -- a spectrum -- spectrum data -- Rd and measurement -- a spectrum -- if spectrum data are set to Sd and dark current data are set to Da -- [0052]
[Equation 1]
d=log{(Rd-Da)/(Sd-Da)}
[0053] Coming out and defining, a control section 3 computes the amount of components contained in the measured object M based on the multiple regression analysis by following several 2.
[0054]
[Equation 2]
Y=K0+K1, A(lambda 1) +K2, andA (lambda 2)
[0055] However, Y ; The amounts K0, K1, and K2 of components ; A coefficient A (lambda 1), A (lambda 2) ; quadratic differential value of the absorbance spectrum in the specific wavelength lambda
[0056] In addition, for every component which computes the amount of components, the specific amount formula of components, the specific multipliers K0, K1, and K2, wavelength lambda1 and lambda2, etc. are beforehand set up by the control section 3, it memorizes, and it has at it the composition of computing the amount of components of each component using the specific amount formula of components for every component of this.
[0057] [Another operation gestalt]
(1) Although it constitutes from an above-mentioned operation gestalt so that the amount of target extinction may be calculated and the amount of extinction by the extinction device 7 may be adjusted if possible to the calculated amount of target extinction based on the measurement conditions inputted beforehand For example, it is also possible to constitute and carry out so that the amount of extinction by the extinction device 7 may be adjusted so that the amount of incidence to the light-receiving means 8 may turn into a setting proper amount based on the light income actually received with the photo sensor 18. Moreover, while calculating the amount of target extinction and, adjusting the amount of extinction by the extinction device 7 to the calculated amount of target extinction if possible based on the measurement conditions inputted beforehand It is also possible to constitute so that the amount of extinction by the extinction device 7 may be tuned finely so that the amount of incidence to the light-receiving means 8 may turn into a setting proper amount based on the light income actually received with the photo sensor 18.
[0058] (2) Although two or more extinction objects 25 which can be set in the extinction device 7

showed opening 25a, 10% ND filter25b, 1% ND filter25c, and the example that consists of 25d of ND filters 0.1% with the above-mentioned operation gestalt, as shown in drawing 8 , two or more extinction objects may be constituted from two or more openings 28 from which the opening area formed in body of revolution 26 differs, and may be carried out, for example. incidentally, each of two or more openings 28 is formed circularly -- having -- opening as 1st extinction object 28a -- a diameter -- 10mm -- opening as 2nd extinction object 28b -- a diameter -- 7.5mm -- a diameter is constituted by 5mm and opening as the 28d of the 4th extinction objects is constituted for opening as 3rd extinction object 28c by 2.5mm in the diameter.

[0059] (3) Although the above-mentioned operation gestalt showed the example which is made to carry out rotation actuation of the body of revolution 26 in which two or more extinction objects 25 were formed, and changes the amount of extinction by the extinction device 7 It is also possible to constitute and carry out so that the amount of extinction by the extinction device 7 may be changed by replacing with this configuration, establishing two or more extinction objects 25 in the slide migration direction of a slide mobile in the condition of separating spacing, and carrying out slide migration of that slide mobile. Moreover, like the above-mentioned operation gestalt, it is not restricted to four, and according to measurement conditions etc., it changes into two, three, and five or more suitably, and the number of the extinction objects 25 can be carried out.

[0060] (4) Although the exposure of the light which irradiates the measured object M from the beam light source 6 in the floodlighting means 1, and charge accumulation-of-electricity time amount of a line sensor are made into the set-up constant value with the above-mentioned operation gestalt For example, you may make it change both the exposure of the light which irradiates the measured object M from the beam light source 6 in the floodlighting means 1, and both [either or] of charge accumulation-of-electricity time amount according to measurement conditions, such as a form of the measured object M, and magnitude. When explanation is added and it is the measurement conditions to which the amount of incidence to the light-receiving means 8 becomes small Make larger than the set point the exposure of the light which irradiates the measured object M, or charge accumulation-of-electricity time amount of a line sensor is made longer than the set point. On the contrary, when it is the measurement conditions to which the amount of incidence to the light-receiving means 8 becomes large, the exposure of the light which irradiates the measured object M is made smaller than the set point, or charge accumulation-of-electricity time amount of a line sensor is made shorter than the set point.

[0061] (5) Although the floodlighting section 1 and a light sensing portion 2 were constituted from an above-mentioned operation gestalt according to the magnitude of the measured object M so that the location of the vertical direction might be adjusted It is also possible to constitute the floodlighting section 1 and a light sensing portion 2 for the location of the both directions of the vertical direction and a longitudinal direction, enabling free adjustment, and to carry them out according to the magnitude of the measured object M, corresponding to the magnitude of the measured object M in to constitute the floodlighting section 1 and a light sensing portion 2 for a lateral location, enabling free adjustment ****. Moreover, it is also possible to carry out by making the location of the floodlighting section 1 and a light sensing portion 2 into a fixed position irrespective of the magnitude of the measured object M.

[0062] (6) Although the beam light source 6 which irradiates beam light and can change the exposure range by the beam light freely was used for the measured object M as a floodlighting means with the above-mentioned operation gestalt The reflecting plate of the concave surface configuration reflected towards a lower part side so that the light which replaces with this configuration, for example, emits light from a halogen lamp and this halogen lamp may be made to condense, It is also possible to prepare the reflecting mirror sideways changed towards the measured object M which reflects the reflected light by the reflecting plate, and is located in the part for measurement, to constitute and to carry out light which emits light from a halogen lamp so that the measured object M may be irradiated. Moreover, various kinds of things, such as not only a halogen lamp but a mercury-vapor lamp and Ne discharge tube, can be adapted in this case.

[0063] (7) With the above-mentioned operation gestalt, although the filter by opal glass was used as a criteria object, the quality of the material is not limited that what is necessary is just what has a

predetermined absorbance property besides diffusion plates, such as not only this but an obscured glass. Moreover, you may make it a light-receiving means also use other detection means, such as not only an MOS mold line sensor but a CCD mold line sensor.

[0064] (8) the above-mentioned operation gestalt -- the transmitted light from the measured object M -- being based -- a spectrum -- although it constituted so that a spectrum might be measured -- this configuration -- replacing with -- the reflected light from the measured object M -- being based -- a spectrum -- it is also possible to constitute and carry out so that a spectrum may be measured.

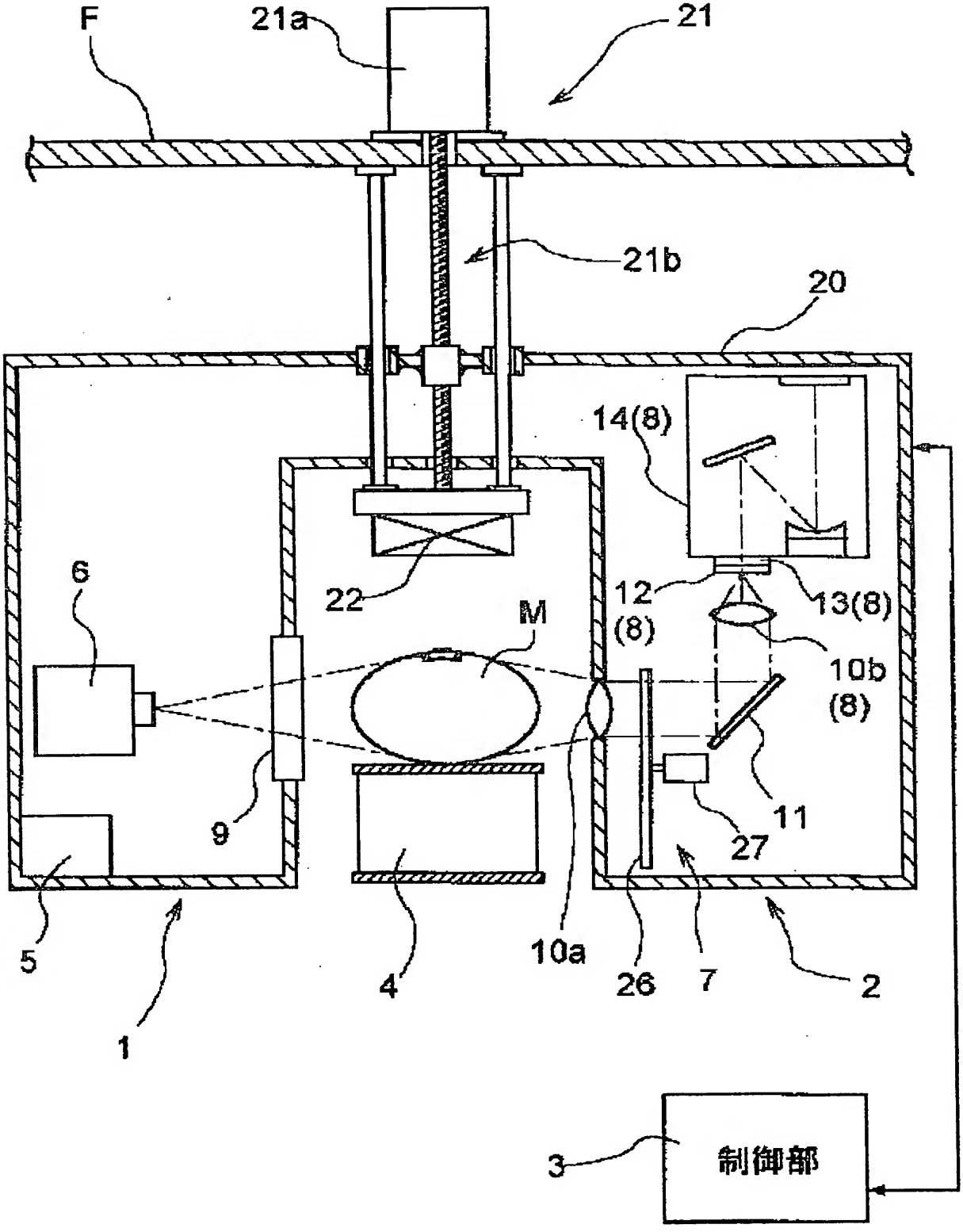
[0065] (9) With the above-mentioned operation gestalt, as internal quality of the measured object M, although a sugar content and acidity were illustrated, the other internal quality, such as information not only on this but a flavor, may be measured.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The outline block diagram of spectral-analysis equipment
[Drawing 2] Drawing showing the exposure range by the floodlighting means
[Drawing 3] The block diagram of an extinction device
[Drawing 4] The block diagram of a spectroscope
[Drawing 5] Drawing showing a vertical repositioning condition
[Drawing 6] Control-block Fig.
[Drawing 7] The top view showing the installation condition of spectral-analysis equipment
[Drawing 8] The block diagram of the extinction device in another operation gestalt
[Description of Notations]
1 Floodlighting Means
3 Control Means
7 Extinction Means
8 Light-receiving Means
25 28 Extinction object
26 Body of Revolution
M A measured object

[Translation done.]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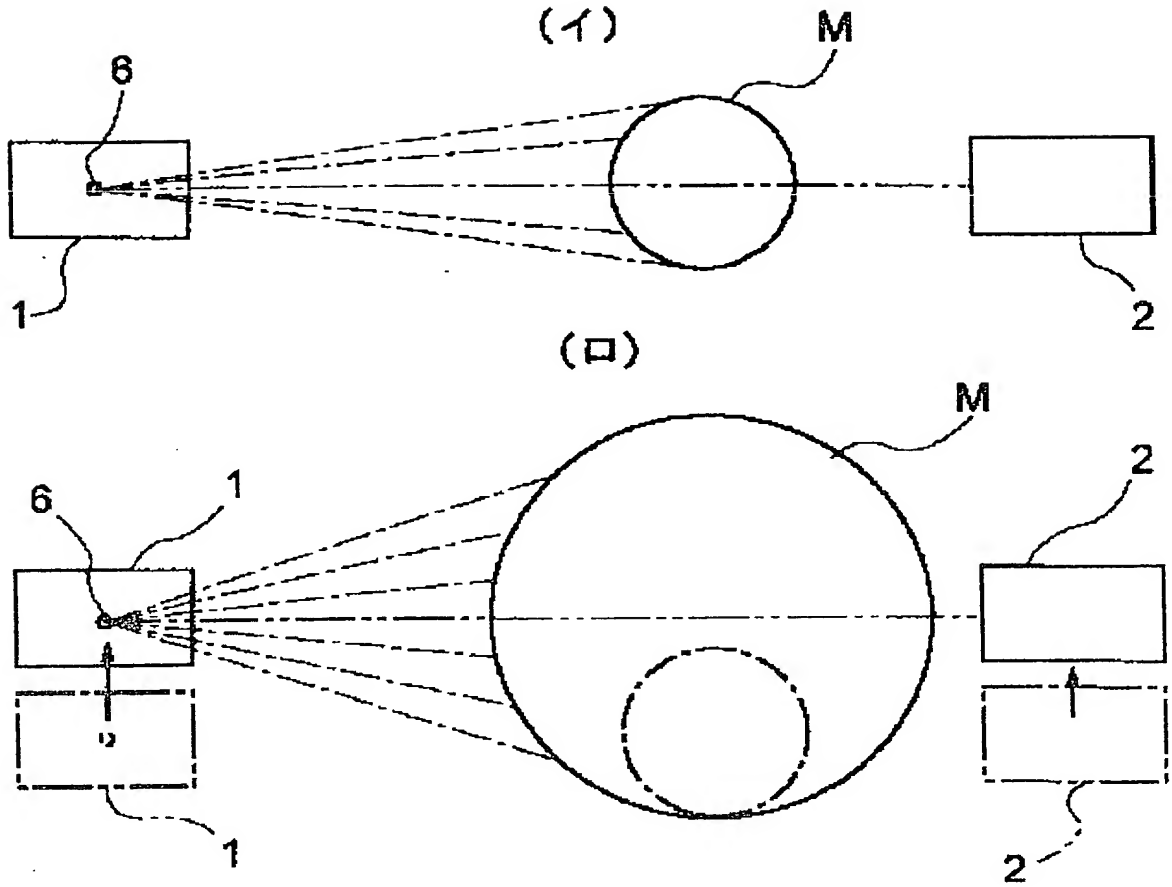
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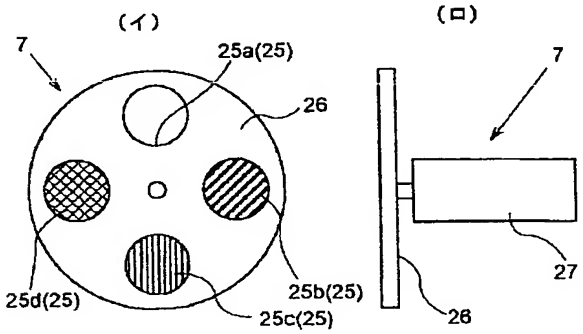

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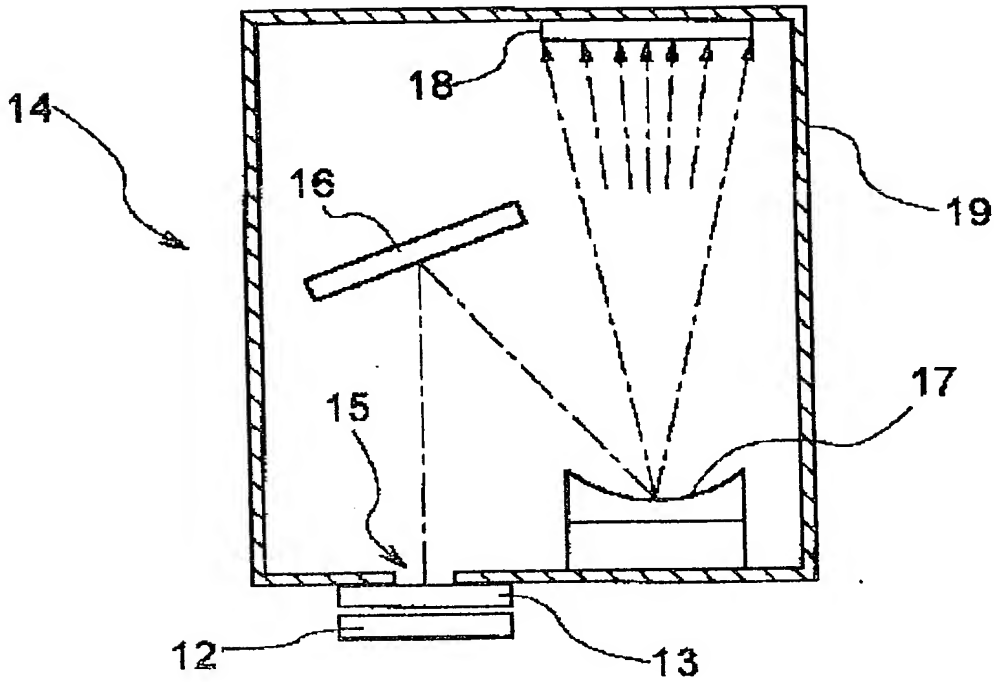
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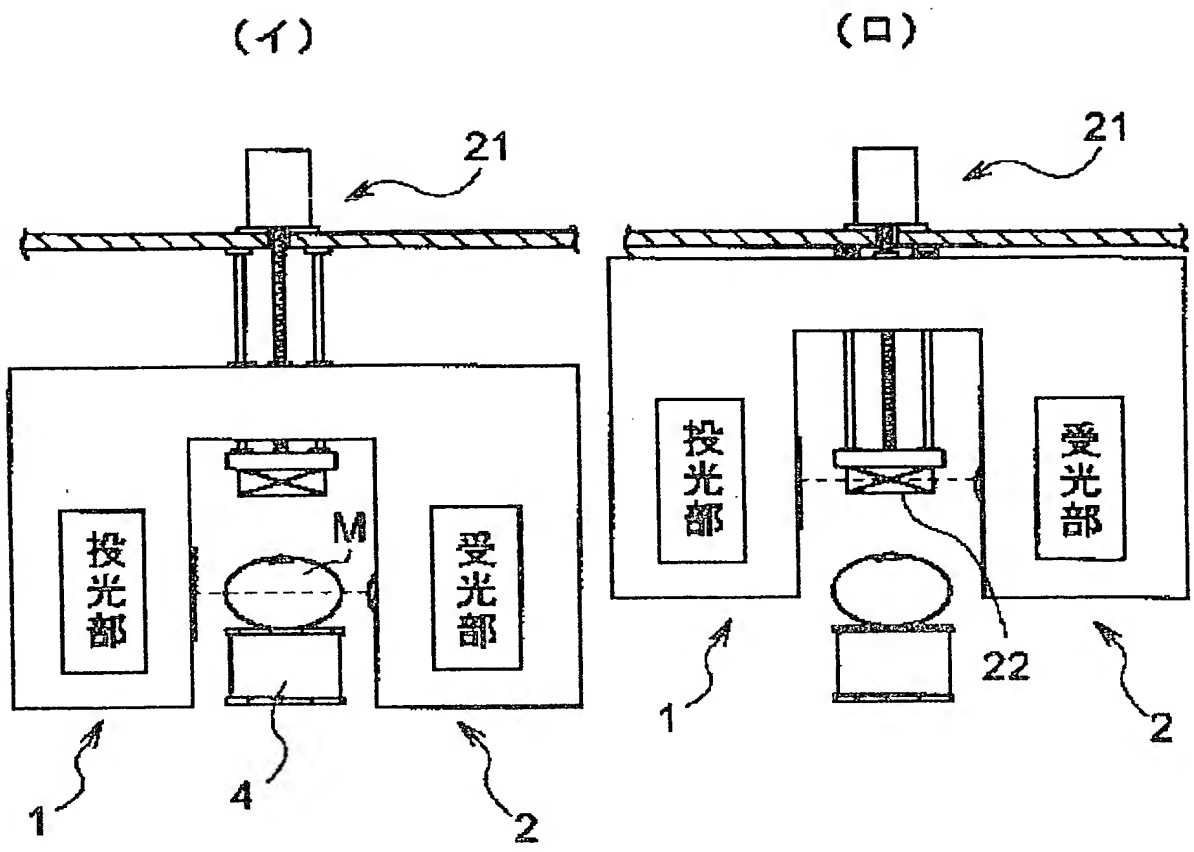
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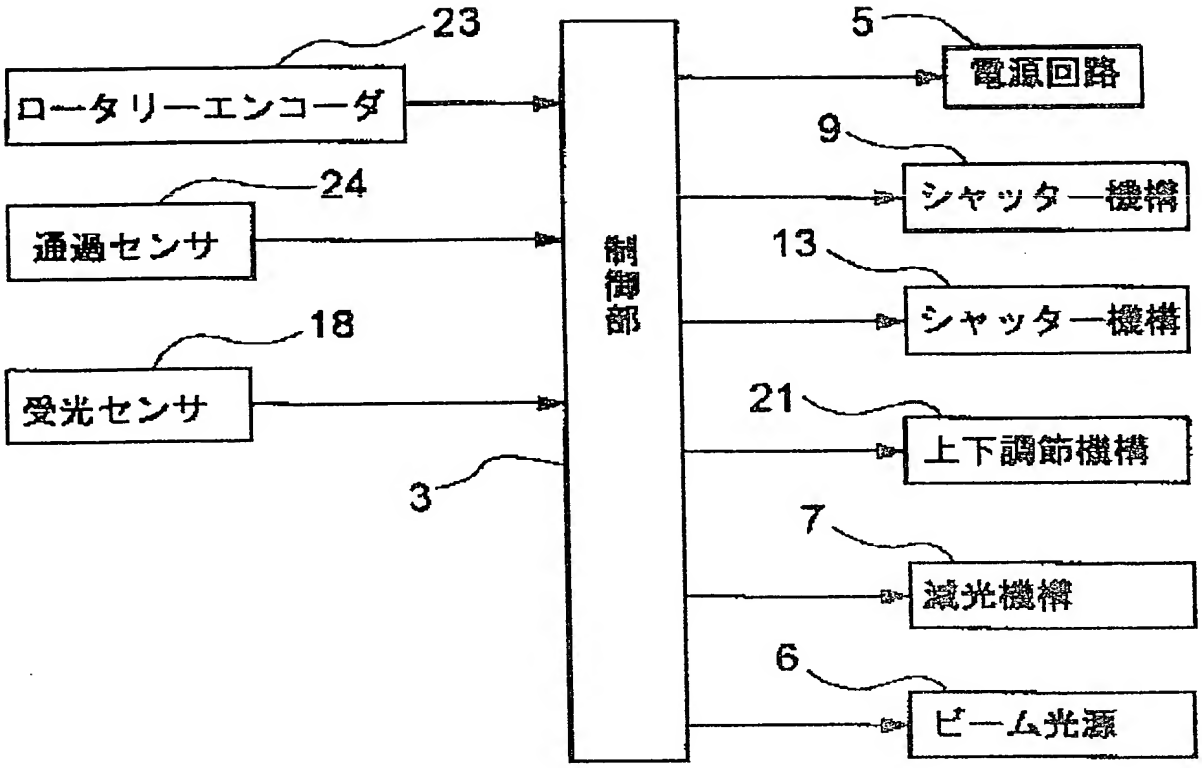
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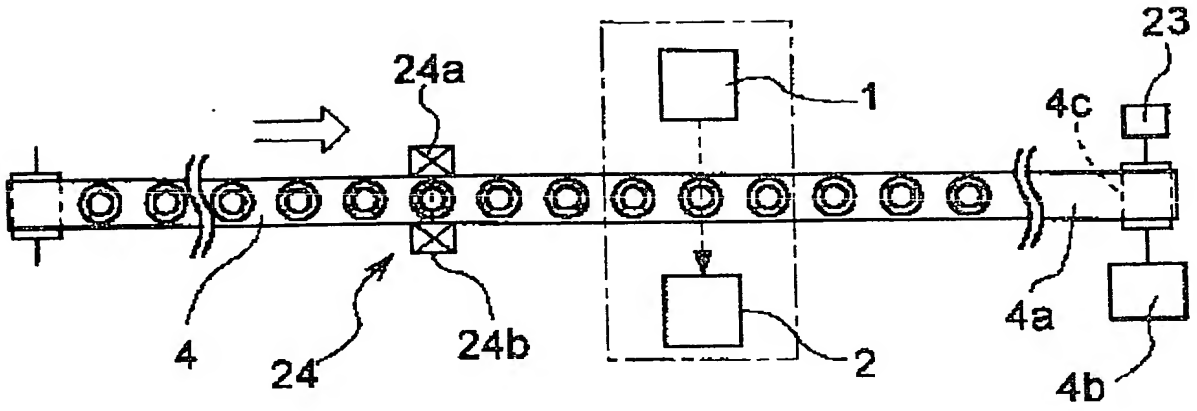
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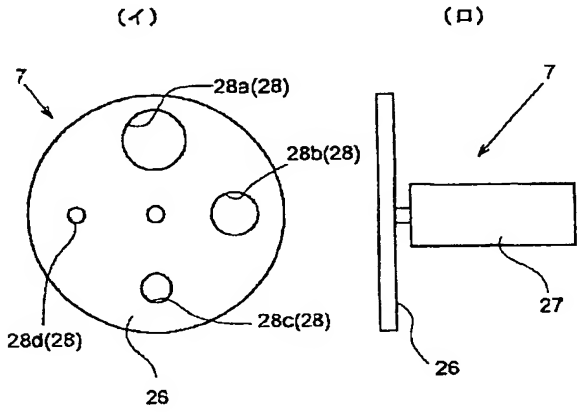

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